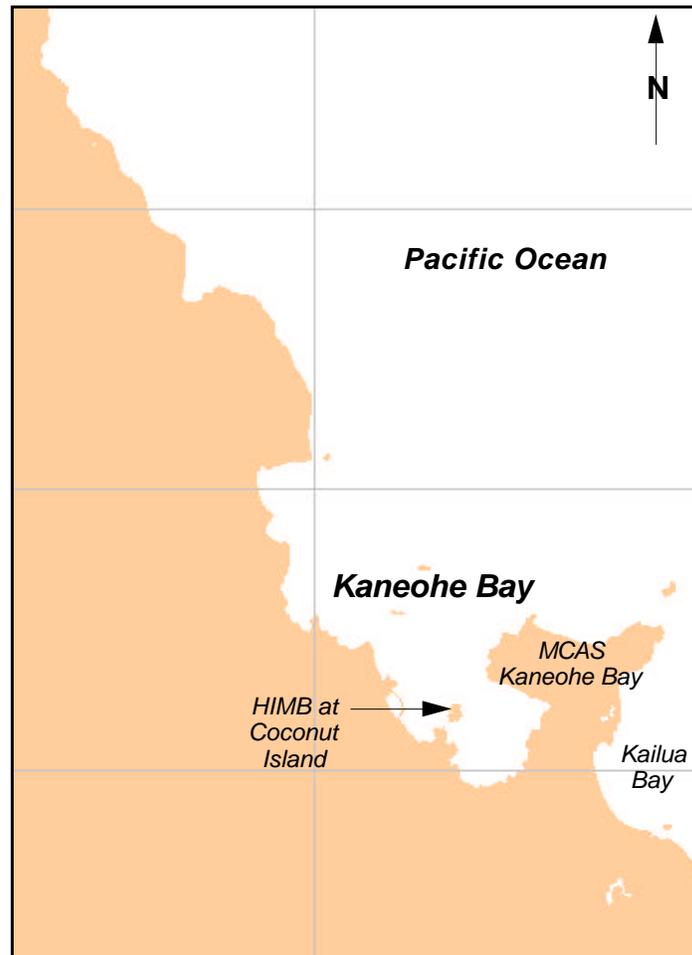


User's Guide

"Aloha" (welcome) to the Location File for Kaneohe Bay, Hawaii. Kaneohe Bay is located on the windward (northeast) side of the island of Oahu, about 20 miles from Honolulu. The bay is about 13 km long by 4 km wide, with an average depth of about 8 m. Kaneohe Bay is protected from strong offshore swell by a barrier reef that marks the windward margin of the bay. This protection allows extensive coral reef development within the bay, including patch reefs and fringing reefs (CISNet Kaneohe Bay, <http://www.hawaii.edu/cisnet/KBay.htm>).



NOAA has created Location Files for different U.S. coastal regions to help you use the General NOAA Oil Modeling Environment, GNOME. In addition, on a case-by-case basis, NOAA develops international Location Files when working with specific partners. Each Location File contains information about local oceanographic conditions that GNOME uses to model oil spills in the area covered by that Location File. Each Location File also contains references (both print publications and Internet sites) to help you learn more about the location you are simulating.

As you work with the Location File for Kaneohe Bay, GNOME will prompt you to:

1. Choose the model settings (start date and time, and run duration).
2. Input the wind conditions.

GNOME will guide you through choosing the model settings and entering the wind conditions. Click the Help button anytime you need help setting up the model. Check the “Finding Wind Data” Help topic to see a list of web sites that publish wind data for this region.

More information about GNOME and Location Files is available at <http://response.restoration.noaa.gov/software/gnome/gnome.html> .

Technical Documentation

Background

Tidal currents and wind-driven currents were modeled inside Kaneohe Bay; however, both currents are weak and we would expect windage (winds blowing directly on the floating oil) to dominate oil movement within the bay. Freshwater runoff data from the small streams that enter the bay were studied, but were not used in the Location File because of their insignificant effects on surface currents within the bay.

Extensive reef systems are found within the bay and along the outer coastline. Interactions between these reefs, breaking waves, and the coastal current lead to highly variable small-scale currents on and near the reefs. These small-scale currents were not modeled in this Location File. The model also does not take into account the extensive areas within the bay that are exposed during low tides. Current patterns and shorelines are not adjusted for variable shorelines due to tide changes.

Offshore currents outside the bay were modeled in two parts. The first part is the shelf and shelf break, and the second part is the deep waters off the shelf.

Currents on the shelf and shelf break have two components: a tidal current with an average tidal excursion of about 2 miles on the outer coast and 1/2 mile inside the bay, and a wind-driven geostrophic flow. The wind-driven geostrophic flow was scaled over time to the along-shore component of the wind.

For the deep waters off the shelf, the larger-scale North Central Pacific Flow controls this highly variable flow. Unpredictable eddies of variable sizes and speeds routinely transit the area and tend to dominate the currents (http://coastwatch.nmfs.hawaii.edu/topex/pictures/latest_hawaii.gif).

Current Patterns

The Kaneohe Bay Location File contains three current patterns.

No tidal current stations were available to use in scaling the tidal predictions. Instead, the tidal current pattern was scaled to the tidal current time file derived from a tide height station in the northwestern section of the bay (near 21° 30.11'N, 157° 49.17'W). The GNOME team differentiated the tide heights to get the times of the floods and ebbs, then scaled the magnitudes of the floods and ebbs to measurements presented by Neimeyer (1977). At times, uncertainties in the tidal currents may be as large as 0.1–0.2 knots locally.

The offshore, along-shelf currents are weak next to the coast, and strong seaward off the shelf break. These currents are unpredictable and may even reverse directions at times. This variability is taken into account through a high uncertainty in the strength of the current.

Wind-driven currents play an important role in circulation near the Hawaiian Islands. The wind-driven currents in the Kaneohe Bay Location File are estimated from a geostrophic adjustment to SE winds. These currents are scaled to an offshore current value of 1/3-knot for a 20-knot SE wind at an offshore reference point (21° 32.06'N, 157° 44.26'W).

All current patterns were created with the NOAA Current Analysis for Trajectory Simulation (CATS) hydrodynamic application.

The Kaneohe Bay Trajectory Analysis Planner (TAP II™) is available free of charge from the Hazardous Materials Response Division (HAZMAT) of NOAA OR&R. This program and its documentation can be used for oil spill planning and risk analysis.

References

You can get more information about Kaneohe Bay from these publications and web sites.

Oceanographic

Bathen, Karl H. 1968. *A Descriptive Study of the Physical Oceanography of Kaneohe Bay, Oahu, Hawaii*. Honolulu: Department of Oceanography, University of Hawaii.

Bathen, Karl H. 1978. *Circulation Atlas for Oahu, Hawaii*. Honolulu: University of Hawaii Sea Grant College Program.

Laevastu, Taivo, Don E. Avery, and Doak C. Cox, 1964. *Coastal Currents and Sewage Disposal in the Hawaiian Islands*. Honolulu: University of Hawaii.

Neimeyer, Gary C. 1977. *Numerical Methods for the Simulation of Hydrodynamic and Ecological Processes, with Application to Kaneohe Bay, Oahu, Hawaii*. Ph.D. Thesis. Honolulu: Department of Oceanography, University of Hawaii.

National Oceanic and Atmospheric Administration. 2000. Trajectory Analysis Planner (TAP II™): Kaneohe Bay Technical Documentation, 46 pp.

Weather and Online Information

National Weather Service: Weather Forecast Office and Central Pacific Hurricane Center, Honolulu, Hawaii

<http://www.nws.noaa.gov/pr/hnl/index.shtml>

Current weather and forecasts in Hawaii and around the Pacific region are available by clicking the "Weather Data and Products" button, then clicking the "Current Weather" link. (In the Current Weather section, wind data are provided in a 4-digit format. The first two digits, when multiplied by 10, represent the direction from which the wind is blowing to the nearest 10 degrees True. The last two digits represent the wind speed in knots. For example, a wind reading of 1105 represents wind from 110 degrees at 5 knots.) Other helpful material is available in the "Marine Products" section of this site.

National Data Buoy Center Station Information: Hawaiian Coastal Waters Regional Map

<http://www.ndbc.noaa.gov/Maps/hawmap.shtml>

Current wind conditions and previous 24-hour observations for moored buoy and C-MAN stations in Hawaiian coastal waters.

The Weather Underground, Inc.

<http://www.wunderground.com/US/HI/Kaneohe.html>

Current conditions and forecast at Kaneohe MCBH, Hawaii.

<http://www.wunderground.com/MAR/PH/150.html>

Marine forecast for Hawaiian waters.

University of Hawaii Kaneohe Bay Monitoring Project

<http://www.hawaii.edu/cisnet/contents.htm>

A long-term project to monitor water quality and sediment processes in Kaneohe Bay. The project examines linkages between watershed events and responses of the Kaneohe estuarine/coral reef ecosystem.

NOAA CoastWatch Central Pacific: Sea level altimetry and geostrophic currents using Topex cycle 294 data (Hawaiian Chain)

http://coastwatch.nmfs.hawaii.edu/topex/pictures/latest_hawaii.gif

Image showing the sea surface height (colors and contours) as well as the geostrophic currents (white arrows, derived from the TOPEX altimeter on board the TOPEX/Poseidon spacecraft). Hawaii CoastWatch is funded by contract with the NOAA National Environmental Satellite Data and Information Service (NESDIS) and is hosted by the Honolulu Laboratory of the National Marine Fisheries Service Southwest Fisheries Science Center.

General Information

Hawaii Institute of Marine Biology (HIMB) at Coconut Island
<http://www.hawaii.edu/HIMB/>

A world-renowned research institute situated on Coconut Island in Kaneohe Bay. Ongoing research at HIMB covers many disciplines of tropical marine science.

Oil Spill Response

NOAA Hazardous Materials Response Division (HAZMAT)
<http://response.restoration.noaa.gov>

Tools and information for emergency responders and planners, and others concerned about the effects of oil and hazardous chemicals in our waters and along our coasts.